

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1 and 90-142 are presently pending in this application, Claims 1, 90, 94, 103-104, 108, and 124 amended, and Claims 141-142 added by way of the present amendment.

In the outstanding Office Action, Claims 1, 90-95, 98-109, 112-115, 117-118, 120-121, 124-127, 130-131 and 133-140 were rejected under 35 U.S.C. 102(b) as being anticipated by JP 08-172273 to Yabushita et al.; Claims 96-97, 110-111, 128-129 and 132 were rejected under 35 U.S.C. 103(a) as being unpatentable over Yabushita et al. in view of U.S. 5,586,006 to Seyama et al.; and Claims 116, 119, 122, and 123 were rejected under 35 U.S.C. 103(a) as being unpatentable over Yabushita et al. in view of JP 10-022601 to Hitachi.

First, Applicants wish to thank Examiner Chambliss for the May 12, 2010 and May 17, 2010 telephone discussions at which time the outstanding issues in this case were discussed. During the May 12th telephone discussion, Applicants explained that one embodiment of the claimed invention includes a pad structure area which is larger than the conductor circuit area, and the primary cited references to Yabushita et al. does not disclose this feature. Examiner Chambliss acknowledged that this amendment would overcome the outstanding rejection, but, in his view, would be unlikely to lead to allowance of this case unless further structural features are included in the claims. Thus, in the May 17th interview, Applicants presented further structural features which could be added to the independent claims in order to emphasize patentable features of the invention over the cited references. Examiner Chambliss indicated that each of the structural features presented in the May 17th discussion would be helpful to advance this case to allowance, but further search and consideration is needed. In order to expedite issuance of a patent in this case, independent

Claims 1, 103 and 124 are amended to include structural features discussed in the May 12th and May 17th interviews.

Specifically, amended Claim 1 recites a package substrate including a lower level interlayer resin insulating layer and a lower via hole formed in the lower level interlayer resin insulating layer. An outermost interlayer resin insulating layer is formed over the lower level interlayer resin insulating layer, and a pad structure formed on the outermost interlayer resin insulating layer. A solder resist is formed on the outermost interlayer resin insulating layer and the pad structure, and the solder resist has an opening exposing a partially exposed portion of the pad structure. A conductive connecting pin configured to establish an electrical connection with another substrate is secured to the partially exposed portion of the pad structure via a solder, and the solder is disposed over at least one metal layer formed only in the partially exposed portion of the pad structure. Also claimed is that a via hole is formed through the outermost interlayer resin insulating layer and configured to electrically connect the pad structure to at least one conductive circuit formed below the outermost interlayer resin insulating layer, and that the via hole is positioned directly below the pad structure and directly on the at least one conductive circuit, wherein the planar area of the pad structure is greater than the planar area of the conductive circuit.

Thus, amended Claim 1 recites that the package substrate includes *a lower level interlayer resin insulating layer and a lower via hole formed in the lower level interlayer resin insulating layer*, and that *a pad structure* is formed in an outermost interlayer resin insulating layer *formed over the lower level interlayer resin insulating layer*. An example structure covered by this claim language is shown in Fig. 14 of Applicants original specification. As seen in this figure, the package substrate 135 includes a lower level (i.e. inner level) resin insulating layer 52 having a lower via hole formed therein (in the Fig. 14, a plurality of lower level via holes are shown. As also seen, a pad structure 16 is provided in

an outermost resin insulating layer (also numbered 52) formed over the lower level, and a pin 100 is provided on the pad structure 16. As discussed in Applicants' specification, this structure can prevent peeling off of the pad 16 from the resin layer 52.¹

Yabushita et al. discloses a mounting structure for a ceramic wiring board in which a stress relaxation layer is formed. As seen in Fig. 1 of this reference, the substrate 1 has a stress relaxation layer 4 formed thereon, and an insulating resin layer 6 formed directly on the substrate 1 and the stress relaxation layer 4. A solder resist 5 is then formed over the insulating layer 6. A pad structure is formed in the solder resist layer 5 and insulating layer 6. As discussed in the May 17th interview, however, Yabushita et al. does not disclose a lower level insulating layer having a via formed therein. This difference alone patentably distinguishes amended Claim 1 over Yabushita et al.

In addition, however, amended Claim 1 also recites that ***“the planar area of the pad structure is greater than the planar area of the conductive circuit.”*** An example embodiment covered by this claim feature is shown in Figs. 13 and 15 of Applicants' specification. As seen therein, the planar area of the pad structure 16, defined by its opposing ends in Figs 13 and 15, is greater than the planar area of the conductor circuit 66. By contrast, as discussed in the May 17th interview, Yabushita et al. clearly discloses that the pad structure 2 has a substantially smaller area than does the conductor 4. This provides an additional distinction over the cited reference to Yabushita et al.

The secondary references to Seyama et al. and Hitachi are cited only for teaching of the dependent claims, and these references cannot correct the deficiencies of Yabushita et al. Moreover, it would not have been obvious to one of ordinary skill in the art at the time of the present invention to modify the structure of Yabushita et al. to correct the deficiencies of this reference. As discussed in the interviews, Applicants original specification explains that it

¹ US 2009/0053459 (Applicants' published specification) at paragraph 278.

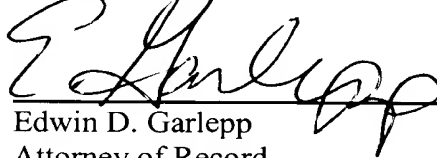
was the present inventors who realized that the structure of the invention provides benefits such as stronger coupling of the pad to the insulating resin, which can improve reliability of the end device incorporating the invention. Applicants submit that it is only with this knowledge from the specification that one of ordinary skill in the art would modify the cited references to arrive at the claimed invention. However, this would be improper hindsight reasoning, which cannot support an obviousness rejection.

For the reasons discussed above, amended Claim 1 patentably defines over the cited references. Independent Claims 103 and 124 are amended to include similar features to those of Claim 1, and thus, these claims also patentably define over the cited references for the reasons stated above. Further, as dependent Claims 90-102 and 104-140 depend from either Claim 1 or 103, these claims are also allowable for substantially the same reasons set forth above for Claims 1 and 103. Nevertheless, new Claims 141 and 142 have been added to recite additional features which provide a further basis for patenting over the cited references. Each of these claims recites “wherein the pad structure connects with the conductor circuit formed on the core substrate.” At least Fig. 17 of the original specification supports this amendment. Further, adhesive strength between the conductor circuit formed on the core substrate and the core substrate itself is facilitated by the feature of Claims 141 and 142. As discussed in the May 17th interview, none of the cited references disclose this feature, and thus the cited references cannot provide the benefits of the feature. Thus, as discussed in the interviews, even if Claims 1, 103 and 124 are rejected, Claims 141-142 should be indicated as allowable.

In view of the amendments and discussions presented above, the present application is believed to be in condition for allowance, and Applicants respectfully request an early and favorable action to that effect.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, L.L.P.

A handwritten signature in black ink, appearing to read 'E. Garlepp', is written over a horizontal line.

Edwin D. Garlepp
Attorney of Record
Registration No. 45,330

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 07/09)

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